FORAGE SUITABILITY GROUP
VERY DROUGHTY LOAM

FSG No.: G060AY130SD

Major Land Resource Area: 60A - Pierre Shale Plains and Badlands

Physiographic Features
The soils in this group are found on upland slopes, terraces, fans and fan remnants, and flood plains.

	Minimum	Maximum
Elevation (feet):	2600	3300
Slope (percent):	0	9
Flooding:		
Frequency:	None	Frequent
Duration:	None	Brief
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	Negligible	High

Climatic Features
This group occurs in a mid-continental climate characterized by wide seasonal temperature and precipitation fluctuations and extremes.

Annual precipitation varies widely from year to year in MLRA 60A. Average annual precipitation for all climate stations listed below is about 15 inches. About 77 percent of the annual precipitation occurs during the months of April through September. On average, there are about 24 days with greater than .1 inches of precipitation during that same time period.

Average annual snowfall ranges from 25 inches at Newell, South Dakota (SD,) to 45 inches at Oelrichs, SD. Snow cover at depths greater than 1 inch range from 40 days at Newell, SD, to 82 days at Colony, Wyoming (WY.)

Average July temperatures across the MLRA are about 74^0F and average January temperatures are about 20^0F. Recorded temperature extremes in the MLRA during the years 1961 to 1990 are a low of -47 at Redbird, WY, and a high of 114 recorded at Oelrichs, SD. The MLRA lies mostly in USDA Plant Hardiness Zones 4a and 4b.

At Rapid City, SD, the closest station with records, it is cloudy about 139 days a year. Average morning relative humidity in June is about 78 percent and average afternoon humidity is 49 percent.

The climate data listed in the tables below represent high and low ranges and averages for the climate stations and dates listed. For additional climate data, access the National Water and Climate Center at http://www.wcc.nrcs.usda.gov.

	From	To
Freeze-free period (28 deg)(days):	118	137
(9 years in 10 at least)		
Last Killing Freeze in Spring (28 deg):	May 26	May 14
(1 year in 10 later than)		
Last Frost in Spring (32 deg):	Jun 07	May 26
(1 year in 10 later than)		

	From	To
First Frost in Fall (32 deg):	Sep 02	Sep 13
(1 year in 10 earlier than)		
First Killing Freeze in Fall (28 deg):	Sep 11	Sep 21
(1 year in 10 earlier than)		
Length of Growing Season (32 deg)(days):	96	117
(9 years in 10 at least)		
Growing Degree Days (40 deg):	4231	4913
Growing Degree Days (50 deg):	2400	2852
Annual Minimum Temperature:	-30	-20
Mean annual precipitation (inches):	14	17

Monthly precipitation (inches) and temperature (F):

2 years in 10:	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Precip. Less Than	0.11	0.09	0.30	0.65	1.05	1.04	1.06	0.52	0.37	0.38	0.20	0.15
Precip. More Than	0.49	0.74	1.27	2.50	4.02	4.63	2.98	2.22	1.68	1.62	0.89	0.66
Monthly Average:	0.33	0.42	0.83	1.71	2.69	2.78	1.99	1.47	1.24	1.03	0.53	0.41
Temp. Min.	5.3	10.9	20.0	30.6	40.5	49.8	56.3	53.2	41.7	29.9	18.2	6.5
Temp. Max.	34.3	40.5	49.5	61.5	71.8	82.5	91.2	89.8	79.0	65.6	48.3	36.3
Temp. Avg.	19.9	25.3	34.0	45.8	56.0	66.0	73.6	71.5	60.2	48.0	33.5	22.0

Climate Station	**Location**	**From**	**To**
SD0236	Ardmore, SD	1961	1990
SD6054	Newell, SD	1961	1990
SD6212	Oelrichs, SD	1961	1990
SD8911	Wasta, SD	1961	1990
SD9537	Zeona, SD	1961	1990
WY1905	Colony, WY	1961	1990
WY7555	Redbird, WY	1961	1990

Soil Interpretations

Very Droughty Loam soils are moderately deep to bedrock or sand and gravel and are well to excessively drained. They have low available water capacity and moderately slow to rapid permeability.

Drainage Class:	Well drained	To	Excessively drained
Permeability Class:	Moderately slow	To	Rapid
(0 - 40 inches)			
Frost Action Class:	Low	To	Low

	Minimum	**Maximum**
Depth:	20	
Surface Fragments >3" (% Cover):	0	3
Organic Matter (percent):	0.5	4.0
(surface layer)		
Electrical Conductivity (mmhos/cm):	0	4
(0 - 24 inches)		
Sodium Absorption Ratio:	0	5
(0 - 12 inches)		
Soil Reaction (1:1) Water (pH):	6.1	8.4
(0 - 12 inches)		
Available Water Capacity (inches):	3	6
(0 - 60 inches)		
Calcium Carbonate Equivalent (percent):	0	10
(0 - 12 inches)		

Adapted Species List

The following forage species are considered adapted to grow on the soils in this group. Additional information concerning plant characteristics of a number of the listed species as well as individual cultivars of many of those species can be accessed on the web at http://www.plants.usda.gov.

Cool Season Grasses	Dryland	Irrigated
Altai wildrye	F	NS
Basin wildrye	F	NS
Crested wheatgrass	G	NS
Green needlegrass	F	NS
Intermediate wheatgrass	NS	G
Meadow bromegrass	NS	G
Orchardgrass	NS	G
Pubescent wheatgrass	F	G
Russian wildrye	G	NS
Smooth bromegrass	NS	G
Streambank wheatgrass	G	NS
Thickspike wheatgrass	G	NS
Western wheatgrass	G	NS

Warm Season Grasses	Dryland	Irrigated
Big bluestem	NS	G
Little bluestem	G	NS
Prairie sandreed	F	NS
Sand bluestem	F	NS
Sideoats grama	G	NS
Switchgrass	NS	G

Legumes	Dryland	Irrigated
Alfalfa	G	G
Birdsfoot trefoil	NS	G
Cicer milkvetch	G	F
Purple prairieclover	G	NS
Red clover	NS	G
Sainfoin	F	NS
White prairieclover	G	NS

G - Good adaptation for forage production on this group of soils in this MLRA
F - Fair adaptation but will not produce at its highest potential
NS - Species is not adapted to the site and should not be planted

Production Estimates

Production estimates listed here should only be used for making general management recommendations. Onsite production information should always be used for making detailed planning and management recommendations.

The high forage production estimates listed below are based on dense, vigorous stands of climatically adapted, superior performing cultivars. They are properly fertilized for high yields and pest infestations are kept below economic thresholds. Mechanical harvests are managed to maintain stand life by cutting at appropriate stages of maturity and harvest intervals. If grazed, optimum beginning and ending grazing heights are adhered to. Adequate time is allowed for plant recovery before entering winter dormancy under both uses.

Estimates of hay and grazing yields can be calculated from these numbers by multiplying them by a harvest efficiency. A 70 percent harvest efficiency is commonly used when converting to hay yields. Pasture harvest efficiency is highly dependent on the grazing management system applied, ranging from 25 to 50 percent.

Forage Crop	Dryland Management Intensity		Irrigated Management Intensity	
	Low (lbs/ac)	High (lbs/ac)	Low (lbs/ac)	High (lbs/ac)
Alfalfa1	400	2600		
Alfalfa/Crested wheatgrass	1400	2300		
Alfalfa/Intermediate wheatgrass			6900	11400
Alfalfa/Pubescent wheatgrass	1400	2300	6900	11400
Alfalfa/Smooth bromegrass			6900	11400
Crested wheatgrass	900	1700		
Intermediate wheatgrass			6900	11400
Pubescent wheatgrass	900	1700	6900	11400
Smooth bromegrass			6900	11400

Forage Growth Curves

Growth curves estimate the seasonal distribution of growth of the various forage crops. They indicate when the forages may be available for grazing or mechanical harvest.

Growth Curve Number: SD0003
Growth Curve Name: Irrigated Alfalfa
Growth Curve Description: Irrigated Alfalfa, statewide

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	25	25	20	15	10	0	0	0

Growth Curve Number: SD0004
Growth Curve Name: Cool season grass
Growth Curve Description: Cool season grass, statewide

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	40	30	10	5	5	0	0	0

Growth Curve Number: SD0005
Growth Curve Name: Warm season grass
Growth Curve Description: Warm season grass, statewide

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	10	40	35	15	0	0	0	0

Growth Curve Number: SD0002
Growth Curve Name: Alfalfa
Growth Curve Description: MLRA 65, 64, 60A

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	35	35	15	5	5	0	0	0

Soil Limitations

The primary limitation for these soils is their moderate depth to sand and gravel or bedrock and resulting low available water capacity which limits species selection and production potential. On steeper slopes, water erosion is a potential problem during establishment, when renovating stands, and in thin established stands. Livestock trail erosion is a potential problem on established stands. Also, wind erosion is a potential problem during stand establishment and in thin established stands on moderately coarse textured soils.

Management Interpretations

The impact on yields of the low available water capacity of these soils can be reduced by selecting forage species that are highly tolerant to periods of drought and inadequate soil moisture. Including sod forming grass species in stands, especially on steeper slopes, will reduce the potential for sheet and rill erosion. Incorporate both wind and water erosion control practices during the establishment period. Properly locating facilitating practices such as fences, lanes, and water developments can help control livestock movement, reduce trailing perpendicular to steeper slopes, and evenly distribute grazing pressure.

FSG Documentation

Similar FSG's:

FSG ID	FSG Narrative
G060AY120SD	Droughty Loam soils have higher available water capacity and greater production potential.

Inventory Data References

Agriculture Handbook 296-Land Resource Regions and Major Land Resource Areas
Natural Resources Conservation Service (NRCS) National Water and Climate Center data
USDA Plant Hardiness Zone Maps
National Soil Survey Information System (NASIS) for soil surveys in South Dakota, Nebraska, Wyoming, and Montana counties in MLRA 60A
South Dakota, Nebraska, Wyoming, and Montana NRCS Field Office Technical Guides
NRCS National Range and Pasture Handbook
Various Agricultural Research Service, Cooperative Extension Service, and NRCS research trials for plant adaptation and production.

State Correlation

This site has been correlated with the following states: MT, NE, SD, WY

Forage Suitability Group Approval

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Approval Date: 4/22/02